American Electro-platers' Society

(An Educational Society)

Chartered 1909

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MONTHLY REVIEW

NOVEMBER, 1914

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I shall pass through this world but once. Any good thing, therefore, that I can do, or any kindness that I can show to any human being, let me do it now. Let me neither defer nor neglect it, for I shall not pass this way again.—*Amiel.*

NOV 2/ 1914 ©Cl.B310598

MONTHLY REVIEW

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Vol. 1 NOVEMBER, 1914 No. 6

Editorials

ON CRITICISM

In the September issue of the Monthly Review appeared an article by Mr. Joseph Walters in which he congratulates the supreme officers and criticises a paper read by the writer at the annual convention. I thank Mr. Walters for his good wishes and thank him just as much for his criticism, and hope he has opened the door for more of it in the future. I invited criticism of that paper, or rather the subject matter of it and would have been disappointed if it had not been forthcoming.

Criticism, without sarcasm, hurts nobody and often opens our eyes to some defects in our methods that may be of great value to us. Many of the articles that appear in the Review would be of greater value if they were commented on by the members. Why not get busy and send in your ideas and opinions on the papers that are published in the Review? The editor needs them and you will be doing your duty as a member of the A. E. S. Mr. Walters is leading in commenting on so lowly a thing as pickling. Why not take up the more important operations of our craft and tell us how you do things? If you feel called upon to hammer your brother platers' methods, don't worry about making him "sore;" the chances are he will find something in your criticism that will benefit him and possibly others; the final result may possibly prove beneficial to all of us.

In order to encourage just such papers as the one written by Mr. Walters, I appoint him a committee on "Comment and Criticism," with authority to appoint as many co-laborers as he may wish, and whose duty it will be to criticise the articles as they appear in the Monthly Review. I invite him to start at once and give us the benefit of his opinion in the Review.

Cincinnati Branch and Toronto Branch ask questions that some member should answer, and send the answer to the editor for publication.

There no doubt are many questions asked at branch meetings that are of interest to all of us. Let the secretaries send them to the editor, and let the membership answer them by

writing papers on the subject, no matter if it is only a short one. Let everyone know what you think about it or what your experience has been in the matter.

With the membership we have it should not be necessary for the editor to request that articles be sent to him, we should all give freely in what measure we can, and if we all put our shoulders to the wheel, and each do his share, the editor would have material to spare instead of being compelled to beg for enough material to get out a monthly issue.

Let us all get busy and do our share. It is not fair for us to stand aside and let the other fellow do it all.

J. H. Hansjosten.

THOUGHTS ON STANDARDIZATION

A standard is that which is established as a rule to be followed or a model to be copied by respectable authority, by custom or by general consent.

The word "standard" comes from the Italian "stendere," meaning to spread out or extend. The only reason for standardization is because men "spread out" their commercial nets and "extend" their enterprises. Multiplicity of effort results in diversity of practice, and diversity of practice tends to uncertainty of aim and confusion of ideas. To get somewhere in our life-work by the most direct route, in the shortest possible time and at the lowest possible cost, we must have a definite goal, keep step together and keep on stepping.

The movement for standardization of electroplating practice is necessary and praiseworthy. We are at the threshold of standardization now. Care should be taken, however, to distinguish between standardization of practice and standardization of standardizing effort. They are too often confused in the first stages of standardizing work and the lack of keeping in mind this distinction inevitably leads to constant reconstruction and delays progress.

Standardization begins in the mind. In all mind processes, thinking is accomplished through the following stages—sensations, images, concepts, ideas, judgments, laws and principles. In other words, we can do no thinking except through sensation. It takes two or more sensations to give us an image of anything. With two or more images, we may have a concept. With two or more concepts, an idea will present itself. By taking two or more ideas we are able to form a judgment. Two or more judgments enable us to determine a law. Two or more laws will give us a basic principle. It is helpful to consider this complexity of the thinking process so that we may be restrained mentally in hurriedly forming supposedly basic conclusions and endeavoring to bridge over a gap between sensations and concepts or ideas and laws, without taking into consideration the intervening images and judgments which are necessary to make the cone of thought complete. Weakness in thought-building

by artificial bridging of this kind is bound to result in detriment to standardizing effort.

Our first care should be in standardizing our thinking about standardization and our method of determination of standardizing values. Standardization is always accomplished by a few men. Less than ten per cent of the members of any industry have anything to do with the standardization of practice. There are not more than ten per cent at any one time that are really interested in it in a practical way. The ten per cent of any industry forms the membership for all associational work and all standardization is brought to perfection by means of these associations.

The chief danger in the early stages of standardization is that endeavor may be made to standardize a practice which may be commonly accepted but may not be justified later on as being the best. Committee work is prone to follow the line of least resistance. Especially is this true when the commonly accepted practice serves the commercial purpose of dominating manufacturing interests.

The first thing to do is to appoint committees on standardization in every branch at once, and let them commence work immediately so that at the time of the next national meeting in 1915, a national committee on standardization may be created which will co-operate with the branch committees and classify the work accomplished with the object of securing the endorsement of the entire society of principles of standardization discovered.

Let it be borne clearly in mind that successful standardizing work is not going to be accomplished by the meeting of the committee once a month at the time of the regular meeting. There are too many disturbing factors for concentrated work. A committee on standardization should meet independently at least twice a month and should be able to make a report at the monthly meeting of the work being undertaken and carried out so as to receive the benefit of the discussion of the branch membership, discussion which often modifies the direction of effort or opens up a new line of consideration. The men selected for such a committee should be chosen chiefly because of their capacity as thinkers, their enthusiasm, but still with a due regard to their practical experience. The committee of each branch should be instructed to maintain correspondence with the committees of other branches with some degree of regularity. Playing a lone hand is spectacular but laborious. It is more beneficial to attain the co-operation of as many minds as possible in standardization work.

We already have established a basis for the immediate consideration of such committees. In the October issue of the Monthly Review we have an article by its editor on "Standardization." In the present issue we have a contribution from the Bridgeport Branch suggesting a standardiization of equipment for all its experimental work. The editor of the Monthly

Review can also furnish us with a digest of all previous standardizing suggestions that may seem to offer a possibility of profitable consideration. The committees appointed by the branches can with profit immediately take action on these suggestions and furnish reports thereon to the editor for publication so that the entire membership of the American Electroplaters' Society may have the opportunity of criticism and comment. I would, therefore, respectfully suggest to the parent body and the branches that such committees be immediately appointed, and that work be commenced at once so that by the next national meeting the preliminaries of the great work will have been settled and a definite course of future effort may be laid out.

HARRY de JOANNIS.

MANAGEMENT OF BRASS SOLUTIONS

By L. H. O'Donnell, Newark Branch

The management of a brass solution is quite a test for the practical plater, and to turn out the day's work at an even color from day to day is the aim of every plater. I believe that the whole secret lies in keeping the zinc, copper and potassium cyanide in the correct proportions. If these chemicals can be kept in their correct proportions, the rest will be plain sailing. The best platers do not owe their success to the formula, but to the manipulation of their solutions. The next item of importance is the proper regulation of the current. The solution, when in proper condition, should be absolutely clear with the exception of the wine tint, due to cyanide of potassium (not cyanide mixture). If the solution is cloudy, it will denote that the metals have not gone into solution and is in need of cyanide. Right here I will say that care should be used in adding the cyanide, as very often the solution will not clear on the addition of cyanide, but will do so after standing a few hours. This is where the plater is apt to be thrown off in arriving at the amount of free cyanide needed for the proper running of the bath. The proper current would be when the work is not giving off gas too freely and yet is plating a good, even color. This is where the skill of the plater also comes in. At times a brass solution will work red, (known as zinc red) on the ends of the work and a good brass color on the back ground or indentations. This would indicate too much zinc, and copper dissolved in cyanide should be added until the desired color is obtained. Another batch of work may plate an orange or streaky effect, this also denotes an excess of zinc, which may be rectified by the addition of copper. After working a solution for a number of hours, the deposit will often change color. This is due to the resisitance of the bath becoming greater at this time than it was at the beginning and the current strength should be raised. When I first started to run a brass solution I used the metallic cyanides.

I made them myself and had excellent results. Then, thinking that I was saving the firm some money, I made up the carbonates of copper and zinc and added them when needed. Do not believe there is any saving in using the carbonates; just figure out the amount of cyanide used in dissolving the carbonates and the time expended in making them. Copper and zinc cyanides can be found on the market of an excellent quality.

I do not believe in using soda in any form, as after a time it destroys some of the cyanide and forms an inert salt in the solution. The bath which I am using at the present time is made up of only copper, zinc and cyanide and it has plated a pretty even color when desired, as it is in use only about three days out of the month.

A great many platers advocate the use of ammonia, which I believe is absolutely essential for a bright brass, but not for work that requires a heavy deposit. Some of the up-to-date platers obtain just as good results by using only copper, zinc and cyanide, and their anodes are also kept clean. Ammonia, in my opinion, is only a dope and is not lasting in its effects.

THE DEPOSITION OF COPPER FROM A CYANIDE SOLUTION.

By P. J. Sheehan, Milwaukee Branch.

So much has been said about the deposition of copper from a cyanide solution, that it is difficult to write something you have not read before, but what I have to say in this article is from my own personal experience and, while I claim I am right, I am open for conviction to the negative, for the saying is "God loves a good loser," and a number of my friends give me credit for being that.

In the first place let me state that I handle approximately 300,000 pieces of work each week to be copper plated, which I divide into three classes. Articles to be copper plated only; articles to be copper plated and polished; articles to be copper plated for the different antique and oxidized finishes.

The article to be copper plated only, don't cause anybody very much trouble, for usually you are not looking for beauty, but for a deposit that will help preserve the article. I do not mean by this that articles to be copper plated only, should be handled carelessly, for carelessness is the germ of trouble, and this germ breeds very fast. Articles to be copper plated and polished must be handled with much more care than articles that are to be copper plated only; for the chances of a polished article blistering is a thousand times greater than one not polished.

Most books you read on the deposition of copper state that blistering is caused by the use of too much free cyanide, or too high a voltage, or both. With this statement I disagree as far

as the deposition of copper is concerned. For I have found the actual test, that work plated in a solution containing so much free cyanide, that it required from 2 to 3 minutes, with a pressure of 6 Volts, to start a deposit, that such work will not blister if properly prepared before entering the bath. After such a test and the results obtained, I thought it was time to look somewhere else for the cause of blistering. The first step was to make up a solution as near right in the amount of free cyanide as possible. In this solution the article was covered with copper a few seconds after entering the bath. For this test I took 2 pieces of polished steel, cleaned them in the usual way, then pickled them for a minute in a dip composed of Water, 4 parts, Hydrochloric acid 1 part, one of the articles I placed in the bath immediately, the other piece I scoured with powdered pumice very carefully before placing it in the bath, I used a presure of 2½ Volts and in 20 minutes when I removed the article from the bath both were blistered.

I next took a piece of polished steel, the same as previously used, which I cleaned in the usual way, the same as the other pieces, the pickle I heated to 180 F. In this dip I allowed the article to remain 20 seconds, then placed it in the bath. In 20 minutes I examined the article, and there was not any sign of blisters. I then raised the pressure to 4 Volts, and let the article run 1 hour and 30 minutes, at the end of which time it was absolutely free from blisters. This test leads me to believe that the principle cause of blistering is an oxide that is invisible to the eye, but which is readily removed with the hot pickle. I have done thousands of pieces of work, both steel and cast iron, with this method, and blisters are unknown. This does not mean that the pickle is the cure-all, for there are other reasons why work fails, but my experience has shown that improper cleaning and pickling is the cause of at least 90 per cent of defective work.

The next in line is copper plating work that is to be oxidized or antiqued. Copper oxidized work, where the black is to have a very high luster, seems to be the most difficult to get uniform results, for such work must be finished on a soft cotton buff, which shows every defect in the article. Articles where the luster is not to be so high, can be finished with a soft wire scratch brush. This covers a multitude of defects, which are very visible when the buff is used. The defects most noted are what platers call trees, which are irregular streaks running through the work. Some platers blame this to the cyanide, others to the soda in the solution, and still others to the liver of sulphur dip.

I have found that work plated with a weak current shows the streaks most, while when plating with a current as strong as it is possible to use without burning the streaks disappear entirely.

From this we may draw the conclusions that for oxidized work the copper should be of a coarse grain, for a weak current

deposits a fine grain, while a strong current deposits a coarse grain, which seems to be the proper copper for oxidizing purposes.

In conclusion let me say that when you have trouble with any of your solutions or work, instead of jumping in and tearing everything to pieces, in an attempt to remedy your trouble, just sit down and work it all out on paper and then apply whatever remedy is necessary, and you will find you not only save time and your patience, but also your employer's money.

THE STANDARDIZATION OF ELECTROPLATING PRACTICE *

Standardization of practice in all human endeavor is always accomplished before the highest results can be obtained to effect a world-wide distribution of the products involved by the work done.

Nobody knows who invented the first barrel. The barrel form of construction for packages was doubtless evolved from the gourd. It admitted of good packing and offered great strength and ease of handling. The barrel form will support a greater load than any other at the present time and the weight of one end of an ordinary box car has been known to be supported by a barrel. As soon as these essential qualities were recognized and barrels came in demand, the users required a standard form, height, diameter, depth of chime and banding material. The user forced standardization of shape and material. The manufacturer was forced in turn to standardize the machinery, material and eventually his methods. Standardization of the methods was brought about by the severity of competition and every useless operation in the process of manufacture was eliminated, to cut down the cost of production.

The electroplating trade is undergoing the same transition Electroplating at first was regarded as a wonderful thing and its method of doing was held as far as possible a secret. As in the case of all other secrets, the electroplating secret ceased to be one, and other people found out the basic methods of operation. The secrecy of the electroplating room has disappeared and the electroplater, instead of being considered as a high-priced wizard, is now obliged to produce the work assigned to him along lines which are clearly defined and in ways which can be duplicated by his successor. The strength of the position of the foreman plater depends now and must depend in the future upon his absolute ability to cope with all the problems submitted to him, and his safeguard must be found in his allegiance with other electroplating minds to the end of standardizing, as much as possible, electroplating practice and comparing notes with them on known factors of experimental effort. The chief drawback so far has been that of experimenters having paddled their own canoe. There has been no well defined attempt made to create a standard of experimental apparatus,

and yet intelligent comparison of results can only be made if it is definitely known that the conditions of operation are uniform and identical. It is for this reason that we submit for the consideration of all electroplaters everywhere the following suggestions concerning apparatus to be used in all experimental work:

Experiments shall be conducted in an oblong glass tank, a standard size being available for this purpose, 15 in. long, 7½ in. wide and 10 in. deep. This should be of annealed glass, which is ample for the quantity of solution suggested, and the material offering a clear view of operative conditions.

The solutions in all cases shall be five gallons. This quantity is large enough to admit of practical work and to prevent a too speedy robbing of the metal in the solution, and small enough in quantity to allow of frequent changes and not to involve too great an expense.

The experimental cathods shall be a piece of low brass, not less than ⅛ in. in gage and 6x6 in. in size. When using other metals, as will be necessary in work to be outlined later, the future test piece shall be the same size, the character of the metal being distinctly stated and, if possible, the sources of supply given. In suggesting this test piece, there has also been thought given to the necessity of providing a test piece for irregular surfaces and a standard of irregular test pieces readily procured by experimenters is now being sought and will be offered at a later date. In the beginning, however, we can use with certainty a test piece of this kind and make comparisons with the results obtained from it with those obtained on the irregular test piece at a later date.

The lead wires shall be 12-gage wire.

In all cases a storage battery must be used, the character of it being left to the operator, as the results secured from any well-known battery will be uniform.

The anode surface used in the work shall be 6x6 in. sheet anodes, 12-gage. This can be readily secured, and the proportion of anode surfaces is ample to take care of all operative changes and requirements.

We offer these suggestions to the members of all the other branches in the American Electroplaters Society for their consideration, discussion and adoption. We would make special request that the secretaries of these branches report upon the sentiment of their membership, so that with this first attempt at standardization recognized and approved we may be able to carry out the work which can be duplicated and checked with all our other branches and the results compared to the advantage of all the members and development of electroplating certainty.

Furthermore, with the adoption of these suggestions, they will be communicated to all other available experimenters in the electroplating field, workers in chemical laboratories, universities and colleges, to the end that all experiments will be

developed in the same way and the theories and methods offered can receive careful attention without the present barrier of uncertainty as to apparatus used, quantity of solution, etc. It is not to be imagined that these specifications will remain in their present restricted form, but it is fully to be expected that as the work proceeds other specifications will be added, and this will be rendered more certain as a result of the co-operation of all the other workers in the branches of our society. One thing must be clearly borne in mind, and that is that it is always possible to imagine difficulties in the way of standardization. Objections can always be raised that certain cases will bring about a necessity of including other factors and that these may contradict results obtained under the present standardizing practice. It is better, however, to start with an agreed standardizing method and discover imperfections along well defined lines than to obtain results without standardization which admit no comparison and which entail repeated failures by various operators under varying conditions which are discouraging and expensive. We trust that our suggestions will meet with the approval of the entire membership.

*This article is submitted by Bridgeport Branch with the request that the different branches take up the matter at their meetings and get an expression as to whether this is considered the best way to get at their work along experimenetal lines. We have worked this out, and think if all branches will work along the same lines, we will be able to arrive at a standard basis.

THE BENEFITS OF ASSOCIATIONAL WORK TO BE DERIVED TO THE HIGHEST DEGREE ONLY BY INDIVIDUAL CO-OPERATIVE EFFORT

Harry de Joannis, to Chicago Branch

It is with feelings of regret that I cannot expect to be with you in person tonight, to make an effort to contribute to the good-fellowship of your meetings, a good-fellowship which past association with your members has convinced me is always present. I have, however, a strong determination to show you that my desire to help can always be expressed in tangible form in some way or other, and I feel that I would not be doing my full duty unless I did something to prove my interest. Accept, therefore, this brief paper as an evidence of good faith, and be charitable enough to overlook the manifest haste of writing and unpreparedness to present something really worth while.

One thing that impresses me more than anything else in associational work is the abnormal modesty of the individual members of the associational branches when it comes to presenting their share of experiences, knowledge or data to the society. It is simply marvelous how glib a man can be with his tongue in the hotel lobby or in the sundry emporiums of joy and how prolific he will then really be in recounting his practical experiences in many lines, and yet how near he becomes like an oyster in the meetings themselves. I do not believe that such a man really "hangs fire" out of sheer cussed-

ness, but that he really has so little self-confidence that he does not consider what he has to say of sufficient worth for presentation to the members at large or that he is "platform-shy." There are doubtless such men right in this meeting, and I want to urge you to forget yourself as an individual and to regard yourself as a living book of experience bound in human skin, ready to be referred to at all times of need. You may not be a de luxe edition, but at least you should consider that you occupy some space on the library shelf, and you should insist, as a matter of personal pride, that you are indexed at your full value in the catalog. If you never even announce your title nor give evidence of any table of contents, how can you expect rightfully to claim even a part in the fullness and glory of the library itself. Remember this; the first man that ever wrote a book had very little practical experience to draw upon. He had all the critics in the world to roast him, and yet the book was written, because he possessed the moral courage to express his opinion and contribute his share of knowledge in written form to the general fund of human knowledge. His book, however, furnished a stimulus to countless others to write other books. In the same manner, all of you possess some practical knowledge, some interesting and valuable experiences which are hidden in your brain cells and which only await the call of your will to be brought to light and made manifest for the stimulation of others to similar effort. Even if the supposed facts you have been guarding so carefully should be proven to be wrong, you will be the gainer by having your opinion corrected and the truth of other propositions will be more abundantly made manifest.

The main purport of this message is that you SHALL DO SOMETHING. Furthermore, that you shall commence to DO IT NOW. In this life we have a very short period alloted to us to perform service. How short we only realize as the years fly over our heads. Never be afraid of being wrong. More obstacles are encountered in the road of human development through this foolish sentiment than from any other cause. We often have to do twenty times the thing that we suppose to be right in each case to find out at the end how wrong we have been from the very beginning. The joy of it all is that we do at last find out the cause of our error and are able to make greater strides in the right direction. You will have observed during the past few months the steady drift of thought towards the standardization of electroplating practice. In no other field of electroplating effort can your individual co-operative effort be manifested to greater advantage. You have in your Chicago branch men eminently capable of laying out the plans for concerted effort of this character, and you yourself possess many of the facts which are necessary for the bringing about of a definite, scientific method of practice which will release platers from many of their troubles and raise the standard of electroplaters throughout the country. You, each one of you,

are members of this branch, and the payment of your dues is but a very small part of the obligations you have undertaken in your association with your fellows. You expect that the association will be of personal benefit to you. Don't expect for a minute that you can learn from others without giving at the same time. A vessel full to the brim can hold no more, but if something is taken from it constantly there is always room for an equal amount of replenishment. Nothing but constant giving of service can fit you to receive the greatest measure of the blessings that your association with this branch and its members should yield to you. Kindly lose, therefore, your self-consciousness, resolve herewith that you will commence to give and give freely, and if you all do that you will be surprised at the end of another twelve months to what great heights the Chicago Branch of the American Electroplaters' Society has attained.

COMMENT AND CRITICISM

In all books on chemistry examined I have yet to see it mentioned as a law, like the Law of Definite Proportion, for instance, so necessary to chemical working, but always as a theory—as "Ionic Theory," Electrolytic Dissociation Theory" and "Ionization Theory," but never as a law (i. e.) an accepted fact. Why? Some chemists claim there are evidences that it is contrary to known facts as taught in physical chemistry, as in the case of NaCl. (Common table salt) which is claimed by physical chemists that free Na cannot exist in the presence of water. Gentlemen, how about the law of gravitation? We know that anything dropped from a height falls down. Anything heavier than water falls to the bottom of a water vessel, but Metallic Salts, acids and bases, which are heavier than water, when dissolved in water do not fall to the bottom but become thoroughly mixed in the solution, and the liquid contains as much of the metals throughout the whole, at the top as much as in the lower portion of the vessel, in other words the substances rise to the top, defying and against the law of Gravitation. Is it not possible that NaCl when brought into water becomes ionized, and as ions carry a definite charge of electricity, one the positive, the other the negative; one pulling, the other pushing, so to speak, causing an equilibrium—a sort of neutrality is established, and remains so until a current is passed through. It remained for the world's greatest Scientist-Chemist, Sir William Ramsey of England, to disprove the objections of the physical chemists to the Ionization Theory. Says he, "Sodium Chloride (NaCl) in water does not dissociate in sodium and chlorine but into other substances—sodions and chlorions." *It is well right here to observe that the Ionization Theory, while very widely accepted as the true explanation of Electrolysis, is based upon premises distasteful and even repugnant to a number of eminent thinkers. It has done much, however, to advance the knowledge of Electro

*Electro Chemistry by R. A. Lehfeldt, edited by Sir W. Ramsey, K. C. B., F. R. S.

Chemistry, and, as it is accepted by a large number of chemists, a brief mention of its history will not be amiss.

Electroplating is dependent or governed primarily on the laws of Farady, namely: First—The amount of any substances deposited is proportional to the quantity of Electricity which flows through the Electrolyte. Second—The amount of different substances deposited by the same quantity of Electricity are proportional to their chemical equivalents.

Equally as important in successful Electroplating is the acceptance of the Ionization Theory. An intelligent understanding of this theory is essential, and the foundation of efficient Electroplating. Volumes by the score have been published explaining it. Its founder was a Swedish Physicist-Chemist, Swante Arrhinious, in the year 1887, and to him must be given the credit of being the father of Electro-Chemistry, for to the adoption of this theory is due the wonderful results attained in Electro-Chemistry. Briefly the theory is this: "The Atomic substances of metals, acids, bases and salts when brought into solution (Separate) dissociate into Electrically charged ions, positive and negative charges, and that each ion carries a definite charge. As some substances are not Electrolytes—do not dissociate—we can know what and what not to use in a solution, and additions like glue or molasses, seem contrary to Electro-Chemical laws, and is condemned by our friends the Chemists, but their addition is recommended and used by very able platers, but I have never seen an explanation of their reasons for its use. I decided to ascertain their use if possible, and spent many hours in frantic efforts to get some light on the subject. When I was about to give up the search I came across an old book on chemistry, published in 1868, by George Fawn, F. R. S., and late professor of practical chemistry in the University College, London, which gives the explanation. I quote it: "Such a preparation (molasses and glue) is used in ascetic solutions by brewers and wine merchants. Its action is purely mechanical. It clarifies these liquids from the finely divided and suspended matter which often renders these liquids muddy and murky. It is insoluble and falls to the bottom of the tank, carrying with it the insoluble substances to which the turpidity was due." To an Electrolyte is added either a metallic salt to increase its density or a conducting salt to increase its conductivity, and as molasses ($C_{12}H_{22}O_{11}$) or glue (which is made from hides, feathers, horns and bones of animals) are neither metallic nor conducting salts. The chemist condemns their use as injurious, but here we have a true explanation—that it causes a mechanical change, which the laboratory chemist utterly ignores. To be sure filtering will accomplish the same result, but the plater is governed greatly by conditions and cannot always take the time to filter a large solution containing hundreds of gallons like the chemist can filter a liter or two, and for that reason he adopts the next best thing and accomplishes the same result mechanically.

Chemical action is accomplished only by a change in compositions. No change of composition takes place by a simple mixture of two acids, like this mixture, for instance — $2H_2SO_4$ + 1 NHO_3 (2 Sulphuric to 1 of N). The chemical action of acids on metals is the same when used freshly mixed or when cold, the only difference being in rapidity—it will act faster when hot. When an acid is heated it raises the rate of migration of ions—they become more active, travel faster and are therefore doing quicker work. This principle explains and also holds good for heated Electrolytes. That is why we heat some solutions—it becomes more active, it plates faster. It has been tested and always found true that ions travel at different velocities at different temperatures, but always at certain speeds at certain temperatures, and this is known as the law of Migration of ions. For reasons of safety it is best to keep acid mixtures in air-tight vessels, and to get uniform results they are to be used at uniform temperatures and heated when needed. The addition of a metal to a freshly mixed acid which causes it to become hot only adds a rise in the temperature—it gets hotter and is liable to splash out and cause bodily injury.

The relative value of Potassium Cyanide and Sodium Cyanide for Electroplating can best be determined by their Molecular weights. The atomic weight of KCN,

Potassium	(K)	is 39
Carbon	(C)	is 12
Nitrogen	(N)	is 14
	Total,	65

Sodium Cyanide (NaCN)

Sodium	(Na)	is 23
Carbon	(C)	is 12
Nitrogen	(N)	is 14
	Total	49

Forty-nine pounds of Sodium Cyanide will chemically perform the work of sixty-five pounds of Potassium Cyanide, or 13 per cent more.

As the Electroplater is after the Cyanogen and not the Potassium or Sodium you see that in a given weight of the two we have more Cyanogen in Sodium Cyanide than we have in Potassium Cyanide. To make it plainer, say we take a pound of each salt, we have more Potassium in Potassium Cyanide than we have Sodium in Sodium Cyanide

K	39
Na	23
Total,	16

you see that NaCN will perform about one-fifth more work than KCN, because in a given quantity it has more Cyanogen than

Chemistry, and, as it is accepted by a large number of chemists, a brief mention of its history will not be amiss.

Electroplating is dependent or governed primarily on the laws of Farady, namely: First—The amount of any substances deposited is proportional to the quantity of Electricity which flows through the Electrolyte. Second—The amount of different substances deposited by the same quantity of Electricity are proportional to their chemical equivalents.

Equally as important in successful Electroplating is the acceptance of the Ionization Theory. An intelligent understanding of this theory is essential, and the foundation of efficient Electroplating. Volumes by the score have been published explaining it. Its founder was a Swedish Physicist-Chemist, Swante Arrhinious, in the year 1887, and to him must be given the credit of being the father of Electro-Chemistry, for to the adoption of this theory is due the wonderful results attained in Electro-Chemistry. Briefly the theory is this: "The Atomic substances of metals, acids, bases and salts when brought into solution (Separate) dissociate into Electrically charged ions, positive and negative charges, and that each ion carries a definite charge. As some substances are not Electrolytes—do not dissociate—we can know what and what not to use in a solution, and additions like glue or molasses, seem contrary to Electro-Chemical laws, and is condemned by our friends the Chemists, but their addition is recommended and used by very able platers, but I have never seen an explanation of their reasons for its use. I decided to ascertain their use if possible, and spent many hours in frantic efforts to get some light on the subject. When I was about to give up the search I came across an old book on chemistry, published in 1868, by George Fawn, F. R. S., and late professor of practical chemistry in the University College, London, which gives the explanation. I quote it: "Such a preparation (molasses and glue) is used in ascetic solutions by brewers and wine merchants. Its action is purely mechanical. It clarifies these liquids from the finely divided and suspended matter which often renders these liquids muddy and murky. It is insoluble and falls to the bottom of the tank, carrying with it the insoluble substances to which the turpidity was due." To an Electrolyte is added either a metallic salt to increase its density or a conducting salt to increase its conductivity, and as molasses ($C_{12}H_{22}O_{11}$) or glue (which is made from hides, feathers, horns and bones of animals) are neither metallic nor conducting salts. The chemist condemns their use as injurious, but here we have a true explanation—that it causes a mechanical change, which the laboratory chemist utterly ignores. To be sure filtering will accomplish the same result, but the plater is governed greatly by conditions and cannot always take the time to filter a large solution containing hundreds of gallons like the chemist can filter a liter or two, and for that reason he adopts the next best thing and accomplishes the same result mechanically.

Chemical action is accomplished only by a change in compositions. No change of composition takes place by a simple mixture of two acids, like this mixture, for instance — $2H_2SO_4$ + 1 NHO_3 (2 Sulphuric to 1 of N). The chemical action of acids on metals is the same when used freshly mixed or when cold, the only difference being in rapidity—it will act faster when hot. When an acid is heated it raises the rate of migration of ions—they become more active, travel faster and are therefore doing quicker work. This principle explains and also holds good for heated Electrolytes. That is why we heat some solutions—it becomes more active, it plates faster. It has been tested and always found true that ions travel at different velocities at different temperatures, but always at certain speeds at certain temperatures, and this is known as the law of Migration of ions. For reasons of safety it is best to keep acid mixtures in air-tight vessels, and to get uniform results they are to be used at uniform temperatures and heated when needed. The addition of a metal to a freshly mixed acid which causes it to become hot only adds a rise in the temperature—it gets hotter and is liable to splash out and cause bodily injury.

The relative value of Potassium Cyanide and Sodium Cyanide for Electroplating can best be determined by their Molecular weights. The atomic weight of KCN,

Potassium	(K)	is 39
Carbon	(C)	is 12
Nitrogen	(N)	is 14
	Total,	65

Sodium Cyanide (NaCN)

Sodium	(Na)	is 23
Carbon	(C)	is 12
Nitrogen	(N)	is 14
	Total	49

Forty-nine pounds of Sodium Cyanide will chemically perform the work of sixty-five pounds of Potassium Cyanide, or 13 per cent more.

As the Electroplater is after the Cyanogen and not the Potassium or Sodium you see that in a given weight of the two we have more Cyanogen in Sodium Cyanide than we have in Potassium Cyanide. To make it plainer, say we take a pound of each salt, we have more Potassium in Potassium Cyanide than we have Sodium in Sodium Cyanide

K	39
Na	23
Total,	16

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the same quantity of Sodium Cyanide. The only reason for the preference of KCN is, I suppose, because platers in using NaCN have been using it in the same proportion as KCN, consequently too much free Cyanide was formed. Forty-nine pounds of NaCN will do the work of sixty-five pounds of KCN, and you get less of an objectionable element (K) in your solution.

The discoloration of nickel castings caused by heat can be removed in an acid dip, one part Hydrochloric Acid to three or four of water, but cannot be prevented chemically. The only preventative measure to pursue is a mechanical change in construction, to permit a circulation of air between the nickel plated castings and over heated ones. Small washers between the two will accomplish wonders.

There are several methods by which a nickel solution may be analyzed, but the Electroplater should choose the one which should be most representative of his calling. The cyanide test is a chemical process. The Electro-chemical would be the proper one to adopt. I made such analysis with a small piece of platinum wire used as an anode; a half pint tin bucket, costing three cents, hold the solution, and used as a cathode. Copper plate the bucket first, dry and weigh. Fill it up with a measure of solution, attach it to negative pole. Attach the platinum wire to the positive and insert in bucket. Make solution alkaline with Ammonia. Do not permit it to become acid. At the end of two or three hours the solution will become colorless—on exhaustion of metal. Dry and weigh the bucket. The difference in weight signifies the amount of metal in the amount of solution used. This can be done while performing the regular work of plating.

These comments are made by the direction of our Supreme President, and not done in the spirit of the Pharisee (God, I thank thee that I am not as other men are) but to increase the value of the discussions arising from the different views held, and to make our Review more valuable. Until I shall obtain the consent of the other gentlemen to serve me on this, the "Comment Committee," these criticisms will represent my personal views only, but as I, too, am liable to error, I request that each and every one of you not agreeing with me to in turn criticize and comment. This is the only way by which the whole membership can be benefited.

"He that wrestles with us strengthens our nerves and sharpens our skill. Our antagonist is our helper."

JOSEPH WALTERS.

CORRECTION

A mistake occurred in the article by August Heck, entitled "Duplex Copper Plating," published in the October issue of the Monthly Review. In the formula calling for 8 gallons of water, it should read: "Water, 1 gallon."

WHAT THE BRANCHES ARE DOING

NOTE TO THE SECRETARIES—All correspondence for this department must be in the hands of the editor by the 15th of each month.

SUPREME SOCIETY

Meets first week in June, 1915, at Dayton, Ohio. Secretary, Walter Fraine, 507 Grand Avenue, Dayton, Ohio.

NEW YORK

Meets fourth Friday of each month at Broadway Central Hotel, New York City, 8 P. M. Secretary, Joseph Minges, 148 Schenck Avenue, Brooklyn, N. Y.

The regular monthly meeting was held Friday, October 23. It was decided to hold the annual banquet in conjunction with Newark Branch at the Broadway Central Hotel on Saturday evening, February 20, 1915.

An interesting paper was read by Mr. Voss, on the testing of chemicals used in the plating room, a general discussion on the subject followed, the resignation of George E. Abbott was received and accepted.

BRIDGEPORT

Meets third Friday of each month at the office of the Brass World, 260 John Street, Bridgeport, Conn. Secretary, Nelson Barnard, 858 Howard Ave., Bridgeport, Conn.

At our last regular meeting, held October 16, samples of nickel plating over galvanized work were exhibited, the discussion of this subject was deferred until the November meeting.

A paper was read on the standardization of electroplating experiments, and it was agreed to send this to the Monthly Review for publication, so that members of other branches might consider the question.

We are glad to report that our laboratory is completed, and we expect to start in on our winter's work at our next meeting.

CHICAGO

Meets fourth Saturday of each month, 8 P. M., Western Building, Randolph Street and Michigan Avenue. Secretary, H. E. Willmore, 5911 South Boulevard, Chicago, Ill.

The regular monthly meeting was held October 24 with President Oscar E. Servis in the chair. Mr. Harry de Joannis, editor of the Brass World, being in the city and unable to attend the meeting, sent a paper, entitled, "The Benefits of Associational Work to be Derived to the Highest Degree only by Individual Effort." This paper, when read by the secretary, was enthusiastically received. A lengthy discussion took place on the merits of different nickel solutions in which a number of

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the members took part. Preparations are being made for the holding of our annual banquet and the following committees have been appointed. Banquet Committee: E. Lamoureux, J. H. Hall, J. P. Manz, H. H. Posbeck, H. E. Willmore, C. B. Wrout, S. E. Huenerfauth. Hotel Arrangements: E. Lamoureux, C. E. Servis. Provisions and Entertainment: H. H. Posbeck, C. B. Wrout. Papers: H. E. Willmore, Louis Schulte. Programs, Badges, Tickets: J. P. Manz, J. H. Hall. Finance: S. E. Huenerfauth. Publicity: E. Lamoureux, H. E. Willmore, J. H. Hall, W. J. Terpenny. The banquet will be held at the Grand Pacific Hotel, Saturday, December 12.

TORONTO

Meets fourth Thursday of each month at Occidental Hall, Bathurst and Queen Streets. Secretary, Ernest Coles, P. O. Box 5, Coleman, Ont.

The regular meeting was held on Thursday, October 22, with President Magill in the chair and a good attendance. A very successful meeting from every viewpoint. Under the heading of good and welfare, some very good discussions were held. A discussion as to the feasibility of plating a soap bubble proving particularly interesting. One member stating that he has made satisfactory progress along that line. The "Platers' Class" at the Toronto Technical School is now in session for the winter months. The members being at present engaged in the analysis of silver solutions. Accuracy with speed being the objective point.

BUFFALO

Meets first Saturday of each month at the University of Buffalo, 8 P. M. Secretary, John G. Murphy, 71 Dingens Street, Buffalo, N. Y.

The regular monthly meeting was held Saturday, November 7th, and was well attended. The meeting was lively and interesting, all taking part in the various discussions and topics brought up. All members of the special class in electroplating chemistry, attending Technical High School were present. Upon being asked if they considered it worth while and of any special benefit to them, all answered in the affirmative. A review of the work accomplished by this class for the past month was given for the benefit of the other members present who are unable to attend the class. Among some of the tests this month were, besides reviewing, determining free acid in copper sulphate solutions; determining the copper as metal in both the acid and alkaline solutions; finding the difference in metal content of a saturated cold, and a saturated hot solution of copper sulphate, standard solutions for these tests. The class expects to have the tests for free cyanide, as brought before the Electro-Chemical Society, during the next month.

It was suggested that the secretary bring before the members of the other branches through the Monthly Review; the

suggestion, as our society is composed of three classes of members, it would be a good plan to have the button designate the membership class of those wearing it. The national colors, red, white and blue being used in the following manner. Red for associate members, white for honorary members and blue for active members.

It was decided that Buffalo Branch present Prof. Childs with a gold button as a token of our appreciation of his efforts in our behalf.

Regarding the formation of a new branch at Niagara Falls, Buffalo Branch desires to call to the attention of the board of managers and the members at large, before a charter is granted, that former members of our branch at the Falls, with the exception of Mr. Duck, are in arrears for dues. At our next meeting we will have "Standardization of Nickel Solutions" by Prof. Childs.

MILWAUKEE

Meets first Friday of each month at Eagles Hall, 137 Second St., Secretary, E. C. Yaeger, 962 Ninth St., Milwaukee, Wis.

At our last regular meeting a lively discussion took place on cyanide copper solutions. Mr. P. J. Sheehan delivered a paper on the deposition of copper from a cyanide solution.

The following questions were asked and answered: How many amperes, per square foot of surface, should a cyanide copper solution require on iron and steel? Answer: Eight to ten amperes.

What is the proper amount of free cyanide in a copper solution? Answer: Two ounces to the gallon.

What should be the right amount of metal contained in a cyanide copper solution? Answer: Two to three ounces per gallon.

What causes a cyanide copper solution to plate streaky and dark? Answer: Solution too low in cyanide. Streaks may also be caused by improperly cleaning grease from holes in the work.

What can be added to a cyanide copper solution to make it plate clean? Answer: Hyposulphite of soda.

Is it advisable to add soda or potash to a cyanide copper solution? Answer: Yes.

How does a cyanide copper solution act when an excess of hyposulphite of soda has been added and what is the remedy? Answer: Plates rough. Add more cyanide.

What is the cause of a cyanide copper solution plating slow or not at all? Answer: Too much, or not enough cyanide, or too much metal.

How can the conductivity of a cyanide copper solution be increased? Answer: By applying heat or by the addition of soda.

How can it be ascertained when a cyanide copper solution is low in metal? Answer: The deposit is slow, also by analysis.

What causes a cyanide copper solution to blister? Answer: Too much cyanide. Also pickled castings.

Is it advisable to increase the metallic content of Cyanide copper solution by dissolving copper sulphate in water, neutralizing with ammonia or potassium cyanide, then adding to the regular copper solution? Answer: This method considered too expensive and dangerous to use.

How can it be ascertained if a Cyanide copper solution requires cyanides? Answer: When the anodes are covered with a green substance, or when they are black with oxide when the solution is at rest. Anodes will foam under these conditions.

What causes a nickel deposit to turn white or lose its luster when laid away in stock for some time? Answer: Hydrochloric acid fumes will cause it.

What are considered the best anodes to use? Answer: The elliptic anodes, because they do not break easily and have less scrap.

What percentage of iron does a nickel ammonium sulphate solution deposit? Answer: About 11 per cent of iron.

What percentage of iron does a nickel sulphate and boracic acid solution deposit? About 3 per cent of iron.

ST. LOUIS

Meets fourth Saturday of each month at Public Library Assembly Rooms. Secretary, H. H. Williams, 2134 Nebraska Avenue, St. Louis, Mo.

Mr. H. H. Williams, secretary of St. Louis Branch, has succeeded in getting the Board of Education to allow the class in chemistry to meet at the McKinley High School laboratory Saturday afternoons. The St. Louis Republican has this to say regarding the class: "Arrangements are being made by Superintendent Ben Blewett to introduce a special course in the St. Louis schools dealing with the chemistry and scientific handling of electroplating. The course is to supplement other work dealing with the mechanics of the art.

The course is being instituted in compliance with a request from H. H. Williams, secretary of the St. Louis branch of the American Electroplaters' Society."

DETROIT

Meets first Friday of each month at Prismatic Hall, 140 1st Street Secretary, B. E. Miller, 545 Townsend Avenue, Detroit, Mich.

The regular meeting of November 6th was called to order with President John J. Schults in the chair. After the routine business of the meeting was disposed of, Past Supreme President Charles H. Proctor, who honored us with his presence, was called upon to express his ideas upon the subject of preventing nickel from pitting. As a remedy he advocated the immersing of a clean sheet of steel in the solution when not in

use, or to pass chlorine gas into solution, or by the use of common salt or sal-ammoniac.

Mr. Proctor's talk on various subjects proved very interesting and instructive. A general discussion took place until the meeting closed.

PHILADELPHIA

Meets first Friday of each month in the Harrison Laboratory Building, University of Penna., 34th and Spruce Streets, Philadelphia, Pa. Secretary, Philip Uhl, 2432 North Twenty-ninth Street, Philadelphia, Pa.

The regular monthly meeting was held November 6th, with a good attendance. An interesting evening was spent in discussing heavy copper plating and nickel plating, Mr. Samuel Barr showing samples of nickel plated surgical instruments. A general discussion was also had on the ways and means of securing new members.

We expect to have a lecture each month on the fundamental principles of chemistry.

CINCINNATI

Meets once each month at Dennison Hotel, Cincinnati, Ohio. Secretary, F. H. Nordman, 720 Froom Ave., Cincinnati, Ohio.

ROCHESTER

Meets second and fourth Friday of each month at University of Rochester. Secretary, C. V. Haring, 603 Dewey Avenue, Rochester, N. Y.

DAYTON

Meets first and third Wednesday of each month at the Y. M. C. A., Dayton, Ohio. Secretary, Alphonz Lamoureux, 500 East First Street, Dayton, Ohio.

NEWARK

Meets first and third Friday of each month, 8 P. M., 47 Bank Street, Newark, N. J. Secretary, Chas. A. Stiehle, 46 West Madison Avenue, Irvington, N. J.

ELECTED TO MEMBERSHIP

Philadelphia—

Dr. H. S. Lukens.....University of Pennsylvania

Newark—

Louis V. Taylor.....97 Chestnut St., Newark, N. J.
John J. O'Brian.....57 Grafton Ave., Newark, N. J.
Fred M. Seyfarth.....76 Chadwick Ave., Newark, N. J.

New York—

George Gehling
Thomas Brown
Joseph Reuter

APPLICATIONS FOR MEMBERSHIP

Philadelphia—

Robert C. Ledig.....3611 N. Smedley St., Philadelphia, Pa.

Detroit—

Ralph J. Lattimer.....748 Jos. Campau Ave., Detroit, Mich.
Charles F. Metzger.....83 Milwaukee Ave., Detroit, Mich.

Rochester—

Drury Harper.....Rochester, N. Y.

CHANGE OF ADDRESS

A. Holmberg.....212 Forest Ave., Jamestown, N. Y.
George Knecht.....5009 Mervin St., Philadelphia, Pa.
J. Readette.....1021 Rockton Ave., Rockford, Ill.
Fred. J. Neitzel.....111 S. Fifteenth St., Omaha, Neb.
E. Eckenrode.....111 S. Fifteenth St., Omaha, Neb.
M. S. Herman.....2941 W. Walton St., Chicago, Ill.
Charles B. Wrout.....943 Irving Park Boul., Chicago, Ill.
E. Vallier.....383 Fisher Ave., Detroit, Mich.